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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/718,138	11/20/2003	Ye-Yi Wang	M61.12-0583	9085

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EXAMINER	
SAINT CYR, LEONARD	

ART UNIT	PAPER NUMBER
2626	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/718,138	WANG ET AL.	
	Examiner	Art Unit	
	LEONARD SAINT CYR	2626	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 March 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3, 8 - 21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3, 8 - 21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *20 November 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 03/06/09 have been fully considered but they are not persuasive.

Applicant argues that Huang et al., do not teach the grammar rules being automatically generated by the model authoring component from the input schema (Amendment, pages 7, and 8).

The examiner disagrees, since Huang et al., (249) teach that "a context free grammar provides a rule-based model that can capture semantic or syntactic concepts **(e.g. an action, a subject, an object, etc.)** of sentence structure or spoken language**……<Schedule meeting> -> <Schedule command> -> <Meeting Object>…Each of the slots can form semantic or syntactic concepts in which a context-free grammar is written or otherwise provided**" (this example of **<Schedule meeting> -> <Schedule command> -> <Meeting Object>…** represents an input schema; page 15, line 17 – page 16,line 14; page 22, lines 13 - 19).

Applicant argues that Huang et al., (Spoken Language Processing, A Guide to Theory, Algorithm, and System Development; 2001) do not teach assigning a uniform backoff probability to each word hypothesis (Amendment, page 9).

The examiner disagrees, since Huang et al., disclose "**obtaining probabilities for unseen bigrams through Katz's backoff mechanism**. That is, for unseen bigram

$P(w_j \mid w_i)$,

$$P(w_j \mid w_i) = \alpha(w_i)P(w_j)$$

where $\alpha(w_i)$ is the backoff weight for word w_i. (page 618, section 12.3.3.1).

The **uniform language model**, which allows all words in the vocabulary to **follow every word with the same probability** (page 613, section 12.3.1, paragraph 1, last four lines).

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

3. Claims 15 – 18 are rejected under 35 U.S.C. 102(b) as being anticipated by Huang et al., (WO 01/93249).

Regarding claim 15, Huang et al. discloses a composite language model for use in a speech recognition system, comprising:

an authoring component receiving a schema describing semantic classes and slots that model expected word inputs in a domain of interest ("dinner…appointment"), the authoring component generating an automatically learned rules-based model portion having automatically learned grammar rules, automatically generated by the authoring component from the schema to define a grammar that is accessed to words in an input speech signal to portions of a rules-based grammar parse tree that has slots derived from a schema ("this example of page 15, line 17 – page 16,line 14 "**<Schedule meeting> -> <Schedule command> -> <Meeting Object>…**" represents an input

schema); and a computer processor ("multiprocessor systems"), being a functional element of the composite language model authoring system, activated by the authoring component to facilitate automatic generation of the grammar rules ("a context free grammar provides a rule-based model that can capture semantic or syntactic concepts (e.g. an action, a subject, an object, etc.) of sentence structure or spoken language. Each of the slots can form semantic or syntactic concepts in which a context-free grammar is written or otherwise provided"); and a statistical model portion accessed to map portions of the input speech signal to pre-terminals in the rules-based grammar parse tree derived from the schema ("statistical N-gram language model") page 15, line 17 – page 16,–line 14; page 22, lines 13 – 19; page 14, lines 4 – 7).

Regarding claim 16, Huang et al. further disclose that the statistical model portion comprises: a plurality of statistical n-gram models, one statistical n-gram model corresponding to each pre-terminal terminal (see page 16, line 25 - page 17, line 5).

Regarding claim 17, Huang et al. further disclose that the rules-based model portion comprises: a context free grammar (CFG) (see page 3, 28 - page 4, line 5).

Regarding claim 18, Huang et al. further disclose that the composite language model supports a vocabulary of words (see page 17, lines 5-14),and

wherein the statistical n-gram models are trained based on training data, (see page 15 lines 5-8),and

wherein words in the vocabulary that are not used to train a specific statistical n-gram model comprise unseen words for the specific statistical n-gram model (see page 15, lines 5-15).

Claim Rejections - 35 USC § 103

4 Claims 1 – 3, 8 – 14, and 19 -21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Huang et al., (WO 01/93249), in view Huang et al., (Spoken Language Processing, A Guide to Theory, Algorithm, and System Development; 2001).

Regarding claims 1, 10 -12, Huang et al. discloses a speech processing system, comprising:

an acoustic model (see page 10, line 19 and fig. 3, element 112);

a model authoring component receiving an input schema that describes semantic classes and slots that model input words in a domain of interest ("this example of page 15, line 17 – page 16,line 14 "**<Schedule meeting> -> <Schedule command> -> <Meeting Object>…"** represents an input schema"; page 15, line 17 – page 16,line 14; page 22, lines 13 - 19);

a composite language model that supports a vocabulary of words and including a rules-based model portion that has a plurality of automatically generated grammar rules, the grammar rules being automatically generated by the model authoring component from the input schema to define a rules-based grammar parse tree that maps words in a natural language speech input into portions of the rules-based grammar parse tree ("a

context free grammar provides a rule-based model that can capture semantic or syntactic concepts (e.g. an action, a subject, an object, etc.) of sentence structure or spoken language. Each of the slots can form semantic or syntactic concepts in which a context-free grammar is written or otherwise provided"; see fig. 4, element 144; page 15, lines 17 – 22; page 22, lines 13 - 19) and a statistical model portion having a plurality of statistical n-gram models, one statistical n-gram model corresponding to each pre-terminal (see page 16, line 25 - page 17, line 5); and wherein words in the vocabulary that are not used to train a specific statistical n-gram model comprise unseen words for the specific statistical n-gram model (see page 17, lines 28 - page 18 lines 5); and

a decoder coupled to the acoustic model and the composite language model and configured to map portions of a natural language speech input to pre- terminals and slots, derived from a schema, based on the acoustic model and the composite language model (see page 23, lines 5-14).

Huang et al., (249) do not specifically teach that the statistical model portion of the composite language model further comprises: a backoff model portion which, when accessed, is configured to assign a backoff score to a word in the vocabulary, wherein each statistical n-gram model includes a reference to the backoff model portion for all unseen words.

Huang et al., (2001) teach obtaining probabilities for unseen bigrams through Katz's backoff mechanism. That is, for unseen bigram

$P(w_j \mid w_i)$,

$$P(w_j \mid w_i) = \alpha(w_i)P(w_j)$$

where $\alpha(w_i)$ is the backoff weight for word w_i. (page 618, section 12.3 3.1).

The uniform language model, which allows all words in the vocabulary to follow every word with the same probability (page 613, section 12.3.1, paragraph 1, last four lines).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to backoff model as taught by Huang (2001) in Huang (249), because that would better obtain the n-gram model, by only connecting observed bigrams by direct word transitions with correspondent bigram probabilities (page 619, lines 1 – 5).

Regarding claim 2, Huang et al. (249) further disclose that the decoder is configured to map portions of the natural language speech input to the slots based on the rules-based model portion of the composite language model (see page 23, lines 5-14).

Regarding claim 3, Huang et al. (249) further disclose that the decoder is configured to map portions of the natural language speech input to the pre-terminals based on the statistical model portion of the composite language model (see page 23, lines 5-14).

Regarding claim 13, Huang et al. (2001) further disclose that a separate backoff model comprises: referring to a uniform distribution n-gram (page 618, section 12.3 3.1).

Regarding claims 8, and 14, Huang et al. (2001) further disclose that the backoff model n-gram assigns a uniform score to every word in the vocabulary (page 618, section 12.3 3.1).

Regarding claim 9, Huang et al. (249) further disclose a context free grammar (CFG) (see page 3, 28 - page 4, line 5).

As per claims 19, and 20, Huang et al., (249) do not specifically teach that the statistical model portion of the composite language model further comprises:a backoff model portion which, when accessed, is configured to assign a backoff score to a word in the vocabulary, wherein each statistical n-gram model includes a reference to the backoff model portion for all unseen words.

Huang et al., (2001) teach obtaining probabilities for unseen bigrams through Katz's backoff mechanism. That is, for unseen bigram

$P(w_j \mid w_i)$,

$$P(w_j \mid w_i) = \alpha(w_i)P(w_j)$$

where $\alpha(w_i)$ is the backoff weight for word w_i. (page 618, section 12.3 3.1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to backoff model as taught by Huang (2001) in Huang

(249), because that would better obtain the n-gram model, by only connecting observed bigrams by direct word transitions with correspondent bigram probabilities (page 619, lines 1 – 5).

Regarding claim 21, Huang et al. (2001) further disclose that the backoff model n-gram assigns a uniform score to every word in the vocabulary (page 618, section 12.3 3.1).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEONARD SAINT CYR whose telephone number is (571) 272-4247. The examiner can normally be reached on Mon- Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (571) 272-7602. The fax phone number for the organization where this application or proceeding is assigned is (571)-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or (571)-272-1000.

LS
06/15/09

/Richemond Dorvil/
Supervisory Patent Examiner, Art Unit 2626